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Transmitted herewith for filing are papers related to the patent application of:

Inventor(s): **DANIEL SINKOFF**

For: **A VIDEO PROJECTION SCREEN ASSEMBLY**

Enclosed are:

☒ 4 sheet(s) of drawings.

☐ An assignment of the invention to: _____

☐ Certified copy(ies) of the following application(s), the priority of which is hereby claimed under 35 USC §119: _____

☒ A verified statement to establish small entity status under 37 C.F.R. 1.9 and 37 CFR 1.27.

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Independent claims	2	- 3 = 0	x 41 =		x 82 =	
Multiple claims presented			x 135 =		x 270 =	
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Date

James E. Wetterling, Jr.
Reg. No. 31,440

Jennie S. Malloy
Reg. No. 37,670

Peter A. Matos
Reg. No. 37,884

FOR: MALLOY & MALLOY, P.A.
2800 S.W. Third Avenue
Historic Coral Way
Miami, Florida 33129
(305) 858-8000

08/24/98
jc545 U.S. PTO

jc549 U.S. PTO
09/138942
08/24/98

A VIDEO PROJECTION SCREEN ASSEMBLY

BACKGROUND OF THE INVENTIONField of the Invention

This invention relates to a video projection screen assembly having a viewing screen and accompanying supporting frame which may be selectively positioned between a vertically oriented, exposed position for viewing, and a collapsed position for storage and/or transport, wherein the viewing screen may be automatically expanded upwardly to assume the viewing position from a floor mounted or similarly located housing, cabinet or like support structure, in an efficient manner which maintains a flat screen during use and is capable of supporting large screen dimensions.

Description of the Related Art

Typically, projection screens, such as those specifically structured to display video images for televisions or projectors, are formed from a relatively heavy, durable material and include an exterior surface treatment on the exposed portion of the screen being viewed which facilitates a clear and accurate depiction of the video images being projected thereon. Depending upon the particular application or utilization, video projection screens are either permanently mounted in an upright, exposed, vertical orientation, such as when use of the viewing

1 screen is a common or regular occurrence, or such viewing
2 screens are structured to be retracted and stored until a use is
3 required. Of the storable type of screens, they may be
4 configured in a portable assembly, or may be fixed in an out of
5 the way storage location. Such storable screens typically
6 include structure that permits the screen to be rolled upon
7 itself over a roller or like structure for eventual containment
8 within an elongated, generally cylindrical housing. When
9 disposed in a fixed position, such storable screens and/or the
10 housing containing the screen are normally mounted in elevated
11 locations, such as in a ceiling or suspended in a raised
12 location on an elevated bracket secured to a wall or like
13 supporting surface. As such, when use of one of the storable
14 screens is required, the viewing screen that has been disposed
15 in a rolled up orientation for storage is manually or otherwise
16 removed from the housing by unrolling the screen from its stored
17 location, and lowering it downwardly into an exposed, vertical
18 orientation for viewing, thereby permitting gravity to assist
19 the deployment and maintenance of the screen in a viewing
20 orientation.

21 As can be appreciated, however, it is not always convenient
22 or aesthetically appealing to maintain a bracket and/or
23 suspended storage housing in a ready to deploy, elevated
24 location. Such is particularly the case with home entertainment
25 units or office presentation systems wherein it may be very

1 costly or impractical to recess the structure into a ceiling or
2 wall, but continual deployment of the screen itself is not
3 desired. In such circumstances, the available technology of the
4 related art leaves users who cannot build expensive recessing
5 structures and want to conceal the screens with no alternative
6 choice but to leave a screen storage housing permanently
7 suspended and visible, or to utilize portable structures. Of
8 course, such portable structures have a number of drawbacks as
9 well.

10 Specifically, existing portable structures are typically
11 limited to generally smaller, lower quality screens because of
12 conventional space and weight limitations. This can be a
13 serious drawback when utilizing high quality projection
14 equipment and/or when better picture quality is desired. A
15 primary reason for this drawback is the suspension structure
16 that must be employed with the portable screen assemblies. In
17 particular, existing screen deployment structures require that
18 an elevated suspension bracket be present so that the housing
19 may be hung. Typically, however, either due to structural
20 reasons or merely because the aesthetics of a location make it
21 un-desirable, such a permanent bracket is not present. As a
22 result, the assembly must provide its own suspension bracket.
23 The most common type of bracket involves a tripod type assembly
24 with a telescoping support rod. Such a structure is necessarily
25 light weight due to its portable nature and due to the fact that

1 various components must be telescoped upwardly and suspended on
2 a collapsible base. Accordingly, the weight, size and quality
3 of the screen that can be effectively deployed is severely
4 limited.

5 A further drawback associated with portable and even
6 permanently secured storable screens is the need to maintain
7 proper tension for a flat screen surface. Existing structures
8 typically rely on a single, centrally disposed hook or clip to
9 maintain the screen in its viewing orientation. Naturally, such
10 fastening can lead to deformation of the screen during its use.
11 Still, however, increasing the tension or securement of the
12 deployed lower edge of the screen is not practical utilizing
13 existing systems because of the added structure required to
14 substantially secure the entire edge of the screen. Moreover,
15 because of the generally light weight nature of the suspension
16 bracket, too much tension cannot generally be applied, or the
17 screen may collapse on itself.

18 Accordingly, there is a substantial need in the art for a
19 new type of video projection screen assembly that is capable of
20 being utilized with thick, high quality screens of all sizes, in
21 either a portable or otherwise storable manner. Such an
22 assembly should maintain effective screen tension and should be
23 conveniently deployable in a manual or remote fashion.
24 Furthermore, such a system should be structured so as to be
25 effectively concealable when not in use, such as in a cabinet or

1 other article of furniture, so as to substantially mask its
2 presence and such that an aesthetic appearance of a location is
3 not detracted because of the need for permanent mounting
4 structures. Also, such an improved assembly should be portable
5 without compromising screen quality and deployment tension, and
6 unlike conventional storable designs should be capable of
7 automatic deployment.

8 In the design and structure of a preferred video projection
9 screen assembly of the type set forth above, it has been noted
10 that there are in existence other mechanisms in other arts for
11 positioning flexible material structures from a rolled up,
12 stored position to an outwardly extended, planer or expanded
13 position. For example, it is known that certain commercially
14 available mechanisms, such as of the type commonly used for the
15 selective positioning of shade awnings between a stored position
16 and an outwardly extended, operative position have been known
17 and utilized for many years. Typically, such an awning
18 positioning mechanisms include a plurality of arms disposed in
19 spaced apart relation to one another. The arms are disposable
20 in either a folded orientation or in an extended, operative
21 position. Moreover, the awning material is secured to the arms
22 in a manner which facilitates the substantially horizontal,
23 outward extension of the awning from an exterior location on the
24 building and in overlying relation to a door or window for
25 purposes of providing shade as well as other protection from the

1 elements. In order to facilitate extension, these awning
2 structures typically include a biasing spring between the arms
3 so as to assist with the deployment of the awning when use is
4 desired. It is important to note, however, that the awning,
5 when in its operative position is substantially horizontally
6 oriented, and most commonly downwardly angled. As a result, the
7 forces of gravity greatly assist and work with the relatively
8 weak biasing spring during deployment and during maintenance of
9 the awning in its extended position. Naturally, such a
10 conventional structure would be un-effective for use in the
11 vertical, upward deployment of a video screen wherein the weight
12 of the screen and the forces of gravity counter the positioning
13 assembly. Indeed, it is noted that with conventional biasing
14 springs, a typical structure includes a compressed spring that
15 is expanded when the awning is extended. As a result, the
16 spring is at its weakest and least stable when the awning is
17 fully deployed such that the force of gravity is the primary
18 factor maintaining the awning deployed. Of course, such a
19 configuration would not function to maintain a video screen
20 vertically deployed. Moreover, given a preferred embodiment
21 wherein the video screen assembly includes a concealing housing
22 or cabinet, a conventional structure would be insufficient to
23 open a concealing lid while also deploying the screen. As a
24 result, it is evident that someone of ordinary skill in the art
25 would not look to conventional awning deployment structures for

1 assistance with a video screen assembly.

2 Accordingly, there is still a substantial need in the art
3 relating to video projection screens for an assembly which
4 efficiently and effectively deploys video screens of various
5 sizes, including larger more heavy weight sizes, into a vertical
6 orientation from a base storage location. Such a system should
7 be capable of automatic deployment and should not require
8 additional mechanisms or manipulation in order to maintain the
9 screen taut and effectively deployed during use.

10
11 Summary of the Invention

12 The present invention relates to a video projection screen
13 assembly designed to be selectively disposed between an exposed
14 position for viewing, and a retracted position for storage or
15 transport. More particularly, the video projection screen
16 assembly of the present invention includes a screen. The screen
17 is designed to be disposed in a generally collapsed position,
18 when the assembly defines its stored or retracted position, and
19 can be concealed in a floor area or cabinet of a room or the
20 like in which it is intended to be used. For example, the video
21 projection screen assembly of the present invention is
22 preferably integrated into an enclosing, substantially
23 concealing housing or cabinet having a lid, cover or other type
24 of closure structure which is automatically opened or closed
25 depending upon the screen being disposed in its exposed or

1 retracted position as set forth above.

2 In the video projection screen assembly of the present
3 invention the viewing screen is formed of a relatively, durable
4 material having sufficient flexibility to be selectively
5 positioned in either a taut, planer position when exposed for
6 viewing or alternately in its collapsed position. In such a
7 collapsed position, the viewing screen is preferably rolled upon
8 itself, such as on a take up roller rotationally mounted in
9 operative association with a base portion of the assembly.

10 As will be explained in greater detail hereinafter, a
11 positioning assembly is included and serves to "automatically"
12 dispose the viewing screen in the exposed position when desired
13 by a user. This is done primarily due to the fact that the
14 positioning assembly is structured and normally biased to urge
15 or facilitate travel of the screen into the aforementioned
16 exposed position. Conversely, when it is desired to dispose the
17 viewing screen in the collapsed position, an electrically
18 powered motor or alternately a manually powered hand crank may
19 be applied to an exterior fitting serving to manipulate the
20 aforementioned take up roller within the aforementioned
21 cylindrical housing in which the viewing screen is stored.
22 Forced rotation of the take up roller will serve to lower the
23 screen against the biasing force exerted thereon by the
24 positioning assembly, thereby retracting the entire assembly.

25 The positioning assembly itself preferably comprises at

1 least one, but preferably two sets of arms disposed in
2 interconnected relation between a base portion of a support
3 frame and a first portion of the support frame. The
4 aforementioned first portion is preferably defined by an
5 elongated bar or rod secured to an upper, outermost peripheral
6 edge of the viewing screen and travels with the viewing screen
7 as it is selectively positioned between the expanded and
8 collapsed positions. The positioning assembly further includes
9 at least one, but preferably a pair of piston assemblies, such
10 as gas springs, interconnected between the two arm segments of
11 each arm set. Each of the gas springs comprises a piston and
12 cylinder arrangement specifically structured to be normally
13 biased, without external connections to a gas supply, into an
14 extended configuration. Accordingly, when the screen is
15 "released" from its collapsed position, the gas springs,
16 interacting with the two arms of each arm set, will expand or
17 extend outwardly thereby serving to separate or extend the two
18 arms of each arm set from one another. This action will serve
19 to raise the viewing screen into the preferred vertical
20 orientation which defines the expanded position of the viewing
21 screen for viewing.

22 Due to the fact that the viewing screen is formed from a
23 relatively heavy material of the type well known in the industry
24 to facilitate clear and accurate viewing of the video images
25 depicted thereon, a significant "driving force" is preferred to

1 force the screen from its collapsed position and maintain it
2 effectively in its taut, substantially vertical and planar
3 orientation to facilitate proper viewing. In addition the
4 driving force should be sufficient to automatically force open
5 any lid or like closure serving to cover a housing for the
6 projection screen assembly of the present invention.
7 Accordingly, the positioning assembly of the present invention
8 preferably includes two of the gas springs independently or in
9 addition to a more conventional auxiliary spring structure,
10 which may be in the form of one or more biasing springs
11 cooperatively structured with and mounted on or within each of
12 the arm sets so as to interconnect the first portion and the
13 base portion of the support frame.

14 Typically, the biasing spring structure, if integrated with
15 each arm set serves to "spring load" each arm set such that when
16 unrestrained, the two arm segments of each arm set will have a
17 tendency to "straighten out"; aligning themselves end to end
18 rather than in a folded, side by side orientation when in the
19 stored position. It is this spring loaded tendency, as further
20 aided by the structure and position of the gas springs, that
21 functions to orient the arm segments of each set of arms such
22 that they extend the screen from its collapsed position into its
23 exposed, vertically oriented position.

24 Accordingly, an important feature and object of the present
25 invention is the providing of sufficient driving force to

1 maintain a viewing screen of relatively heavy, durable material
2 in a vertically oriented, exposed position and "automatically"
3 accomplish positioning of the viewing screen from its normally
4 stored positioned to the exposed, vertically oriented position.

5 It should be apparent that the weight of the screen is
6 directly related to the size of the screen and accordingly, the
7 larger viewing screen sizes may very well require even
8 additional driving force applied to the viewing screen and more
9 particularly, such a force is preferably applied between the
10 base portion of the support frame and the lower most arm segment
11 of the expanding arm set. For example, such additional or
12 supplementary driving force is preferably supplied by the
13 provision of at least one but preferably a plurality of
14 supplemental gas springs equal in number to the number of sets
15 of arms. Each of the supplemental gas springs are
16 interconnected between the base portion of the support frame and
17 a lower most arm segment of each set of arms serving to
18 drivingly interconnect the first portion to the base portion.
19 Therefore, when the screen is "released" from its stored
20 position, the driving force tending to position the viewing
21 screen into its exposed, vertically oriented position will be
22 supplemented through the provision of the one or more
23 supplemental gas springs serving to exert additional driving
24 force on each of the arm sets.

25 Therefore, it is a primary object of the present invention

1 to provide a video projection screen assembly including a
2 support frame connected in supporting relation to a viewing
3 screen wherein the viewing screen is selectively positionable
4 between a collapsed position for storage and an outwardly
5 expanded, vertically oriented position for viewing.

6 Still another important object to the present invention is
7 to provide a video projection screen assembly which may be
8 mounted within a concealing cabinet, housing or like structure
9 disposed in supported relation on a floor, desk, or the like in
10 which the video projection screen assembly is located, for
11 subsequent raising of the video screen.

12 Another primary object to the present invention is to
13 provide a video projection screen assembly including a support
14 frame having structural components specifically designed and
15 structured to provide sufficient driving force to position the
16 viewing screen and attached, structural components secured
17 thereto out of the collapsed position and into the vertically
18 orientated, expanded position for viewing.

19 It is also an important object of the present invention to
20 provide a video projection screen assembly which may be
21 selectively positioned between a collapsed position and an
22 outwardly extending, expanded, vertically oriented position, for
23 viewing which is not required to be mounted in an out of the way
24 location such as within a ceiling or at other raised locations
25 on a vertical wall or like supporting surface.

1 Another object of the present invention is to provide a
2 video projection screen assembly incorporating a positioning
3 assembly specifically structured to provide sufficient driving
4 force to related components of a support frame so as to easily
5 and freely position the viewing screen from a collapsed position
6 to the vertically oriented, expanded position wherein the screen
7 is exposed for viewing.

8 Yet another object to the present invention is to provide
9 a video projection screen assembly formed of long lasting,
10 durable components, including a viewing screen formed of a
11 relatively heavy and durable material to facilitate clear and
12 accurate viewing of video images projected thereon thereby
13 assuring a long operable life of the subject video projection
14 screen assembly.

15 These and other objects, features and advantages of the
16 present invention will become more clear when the drawings as
17 well as the detailed description are taken into consideration.

18
19 Brief Description of the Drawings

20 For a fuller understanding of the nature of the present
21 invention, reference should be had to the following detailed
22 description taken in connection with the accompanying drawings
23 in which:

24 Figure 1 is a perspective view in partial phantom of a
25 video projection screen assembly of the present invention.

1 Figure 2 is a perspective view of a support frame portion
2 including various structural components thereof absent the
3 viewing screen being attached thereto.

4 Figure 3 is a perspective view of portions of the support
5 frame as shown in Figure 2 wherein the support frame is
6 represented in a stored or collapsed position.

7 Figure 4 is a perspective view of another embodiment of the
8 support frame of the present invention different from the
9 embodiment of Figures 2 and 3 and absent a viewing screen being
10 attached thereto.

11 Figure 5 is a perspective view of the embodiment of Figure
12 4 in a retracted or collapsed position for storage with certain
13 components shown in Figure 4 absent from the structure of Figure
14 5.

15 Figure 6 is a perspective view of the present invention
16 illustrating the preferred integration of a concealing cabinet
17 structure.

18 Like reference numerals refer to like parts throughout the
19 several views of the drawings.

20 21 Detailed Description of the Preferred Embodiment

22 In accordance with the accompanying Figures, the present
23 invention is directed to a video projection screen assembly
24 generally indicated as 10. The video projection screen assembly
25 10 includes primarily a viewing screen 12 formed of a material

1 having sufficient flexibility to be disposed in an outwardly
2 expanded or exposed position for viewing, as shown in Figure 1,
3 or alternately in a retracted, stored position. For example in
4 the embodiment of Figure 1, within an elongated, substantially
5 hollow and preferably cylindrical storage casing 14 may be
6 provided and operatively associated with a base portion of the
7 assembly 10. When in the casing 14, the viewing screen 12 is
8 preferably disposed in a rolled up configuration about a take-up
9 roller (not shown for purposes of clarity). The take-up roller
10 extends between two drive couplings or brackets as at 16 located
11 exteriorly of the storage casing 14 and which are preferably
12 structured to be interconnected to an electrically powered drive
13 motor or a manually powered hand crank or other applicable
14 device which serves to rotate the supply roller mounted on and
15 between the externally located drive couplings 16. Preferably,
16 this take up structure is also sufficient to retract the video
17 screen from the expanded position achieved by the present
18 invention.

19 Further, the viewing screen 12 is formed from a relatively
20 heavy material which may be treated or coated with a reflective
21 or like substance or material commonly utilized in the
22 projection screen industry for providing a clear, accurate
23 depiction of the video images projected thereon. Also, the
24 viewing screen 12 may have a surrounding border as at 18 and a
25 central viewing area as at 20. When the viewing screen 12 is in

1 its exposed, expanded position, for viewing it assumes a taut,
2 vertically oriented position, as best shown in Figure 1, so as
3 to provide a "flat" viewing area thereby facilitating accurate
4 depiction of the video images projected thereon.

5 The video projection screen assembly of the present
6 invention further comprises a support frame shown in phantom in
7 Figure 1 and shown in more detail in Figures 2 and 3. More
8 specifically, the support frame includes a first portion 24 and
9 the base portion 26. The first portion 24 is preferably in the
10 form of an elongated rod or bar fixedly attached to the upper,
11 outermost end of the screen 12, as clearly shown in Figure 1.
12 The bar 24 travels with and/or pulls the screen 12 as it moves
13 between the collapsed position for storage and the expanded
14 position, exposed for viewing. In addition to the take-up
15 roller, the base portion 26 may include an elongated mounting or
16 support bar 28 as well as a plurality of mounting brackets 30
17 secured or attached to the support bar 28 and serving to fixedly
18 attach the support frame, to an exterior supporting surface,
19 such as within a concealing cabinet or housing or base or to
20 another support surface such as a desk or table top wherein the
21 entire projection assembly is mounted by means of the securing
22 brackets 30. It is noted, however, that in a preferred
23 embodiment, the securing brackets 30 may comprise a removable
24 structure so as to facilitate portability of the assembly. Also
25 in the preferred embodiment wherein the support frame is secured

1 to a cabinet or housing, the cabinet or housing may be
2 structured to be transportable, such as on a plurality of
3 casters, or may be fixed in place if a more permanent placement
4 of the video projection screen assembly 10 is preferred. In
5 either instance, the base portion 26 preferably provides a fixed
6 reference against which the screen expands, and an efficient
7 housing to receive and retain the rolled up or retracted screen
8 12.

9 An important structural feature of the support frame of the
10 present invention is that it includes at least one but
11 preferably two spaced apart sets of arms as at 32 and 34. Each
12 of the sets of arms 32 and 34 includes a pair of arm segments,
13 such as a lower arm segment 36 and an upper arm segment 38,
14 pivotally connected to one another at correspondingly positioned
15 ends by means of a "knuckle" joint generally indicated as 40.
16 The sets of arms 32 and 34 may be considered part of a
17 positioning assembly which serves to position and maintain the
18 viewing screen 12 in the expanded position as shown in Figure 1,
19 wherein such expanded position is at least partially defined by
20 the viewing screen 12 being disposed in a planer, vertical
21 orientation and being sufficiently taut to assure the flatness
22 of the exposed viewing surface 20 for video images being
23 depicted thereon. As clearly shown in Figure 2, the arm sets 32
24 and 34 are drivingly interconnected between the base portion 26
25 and the first portion 24 of the support frame such that

1 extension thereof spaces the first portion 24 and base portion
2 26 from one another. Preferably, outer distal ends 38' of the
3 upper arm segments 38 are pivotally connected to the first
4 portion 24. Conversely, the distal ends as at 36' of the lower
5 arm segments 36 are pivotally or otherwise connected by a pivot
6 coupling 39 to the base portion 26. In the preferred
7 embodiment, each of the couplings 39 may be fixedly secured to
8 the base portion 26 and can be considered a part thereof.
9 Mounting brackets or like attachments 41 serve to support and
10 fixedly secure the couplings 39 to the base portion 26 and are
11 to be considered a part thereof.

12 An important feature of the present invention is the
13 inclusion in the aforementioned positioning assembly of at least
14 one, but preferably two piston assemblies. Although a variety
15 of strong piston assemblies may be utilized, in the preferred
16 embodiment, a pair of gas springs 50 are cooperatively
17 structured and drivingly interconnected with each of the sets of
18 arms 32 and 34 and preferably between the lower arm segment 36
19 and the upper arm segment 38 of each of the sets of arms 32 and
20 34. As set forth above, Figures 2 and 3 respectively show the
21 support frame in the expanded and collapsed positions for
22 viewing and storage. When in the collapsed position, the gas
23 springs 50 associated with each of the arm sets 32 and 34 are
24 disposed in a compressed position, as shown in Figure 3. When
25 in such compressed position, the gas springs exert an outwardly

1 extending or "driving force" on the upper arm segments 38 of
2 each of the arms sets 32 and 34. As such, in the preferred
3 embodiment a lock assembly is provided so as to counter the
4 force of the gas springs 50 and maintain the screen 12 in the
5 retracted position until use is desired. In the preferred
6 embodiment, the lock assembly is integrated as part of the take-
7 up structure couplings 16, such as utilizing a latch, pin or
8 clutch mechanism on the drive rollers which retract the screen
9 when actuated. Moreover, it is preferred that the lock assembly
10 be remotely actuatable so as to permit the screen to be remotely
11 deployed into its expanded position when desired. Along these
12 lines, remote retraction is also contemplated.

13 Because of the strength of the gas springs 50, when the
14 viewing screen 12 is released from its retracted, collapsed
15 position, it is essentially, "automatically" positioned into its
16 exposed, expanded position as the respective gas springs 50
17 associated with each of the sets of arms 32 and 34 expand
18 outwardly into their normally extended position, as shown in
19 Figure 2, and straighten the arms. Interconnection of each of
20 the gas springs 50 to the respective arm segments 36 and 38 of
21 each arm set 32 and 34 occurs by means of fixedly mounted
22 flanges or the like 53 and 55.

23 The utilization of the gas springs 50 is especially
24 beneficial in the embodiment of Figure 6. In this embodiment,
25 the screen 12 and generally a remainder of the support frame are

1 concealed within a cabinet 65. The cabinet 65 functions as part
2 of the base portion, and as previously recited provides a secure
3 base to which the support frame is fastened and against which
4 the gas pistons 50 gain leverage for deploying the screen 12. In
5 the preferred cabinet embodiment, a lid 66 is provided to
6 conceal the presence of the video projection screen assembly 10.
7 As a result, the overall assembly can be integrated into a floor
8 or other cabinet, with only the lid 66 being required to be free
9 from encumbrances. In this regard, the preferred structure of
10 the lid includes a hingedly attached structure that is normally
11 in the closed position. As a result, when remote deployment of
12 the screen 12 is desired, the force of the screen being lifted
13 is sufficient to open the lid 66 of the cabinet 65. Such
14 provides for a particularly aesthetic and concealed appearance,
15 and is preferred especially because higher quality cabinet
16 material also tends to be heavier, but the cost of an additional
17 lid opening mechanism may not be desirable. Of course, it is
18 understood that the lid may be remotely opened as part of a
19 secondary mechanism, and the cabinet itself may take on any of
20 a number of configurations including a recessed area within a
21 floor or wall surface depending upon the space constraints and
22 decorative needs of a user. Accordingly, only when the screen
23 12 is required will it be visible within a room.

24 Although the gas springs can be configured of varying sizes
25 and strengths to correspond with the relatively heavy weight of

1 a high quality viewing screen 12 and to ensure that the viewing
2 screen 12 is maintained in a vertical orientation and overall
3 planer configuration as it travels to and is maintained in the
4 exposed position of Figure 1, the positioning assembly may also
5 include an auxiliary spring assembly, such as a biasing spring
6 structure, preferably mounted on the interior of each of the arm
7 sets 32 and 34. Such biasing spring structure can be associated
8 with each of the arm sets 32 and 34 may be of somewhat typical
9 construction. Such construction provides a spring loading
10 serving to normally bias or facilitate outward extension or
11 separation of the lower and upper arm segments 36 and 38 of each
12 of the arm sets 32 and 34. More specifically, the spring
13 loading of the arm sets caused by the internally mounted biasing
14 spring structure may be provided by running a steel cable from
15 the inside of one arm segment, around the knuckle joint 40 which
16 serves to pivotally interconnect corresponding ends of the
17 respective arm segments 36 and 38 of each arm set to the inside
18 of the opposite arm segment. In one arm segment, the steel
19 cable will be tied off or secured. Inside the other arm segment
20 the steel cable would be connected to one or more steel coil
21 springs serving to specifically define a biasing spring
22 structure on the interior of one of the arm segments 36 or 38.
23 Such biasing spring exerts a pulling force on the cable. This
24 pulling force, wherein the cable passes around the knuckle
25 joint, causes the arm segments to be biased outwardly so as to

1 generally assist them in separating or assuming the expanded
2 position, as shown in Figure 2, if necessary. Still, due to the
3 fact that screen 12 is formed from a relatively heavy material
4 and also that the viewing screen 12 is maintained in a vertical
5 orientation, the force derived from the spring loading of the
6 biasing spring within and in cooperation with the two arm sets
7 32 and 34 is generally not sufficient in and of itself to
8 selectively and effectively position the viewing screen 12 in
9 the desired exposed orientation. Accordingly, if used, they
10 will generally supplement the preferred positioning assembly,
11 namely a gas spring 50 associated directly with at least one,
12 but preferably each of the arm sets 32 and 34.

13 With regard to the Figures 4 and 5, another embodiment of
14 the present invention is disclosed wherein supplemental gas
15 springs such as at 60 and 62 may be added to substantially
16 increase the driving force to each of the arms sets 32 and 34.
17 Such supplemental gas springs 60 and 62 are drivingly
18 interconnected between the base portion 26 of the support frame
19 and preferably the lowermost arm segment 36 of each of the arm
20 sets 32 and 34. It is, of course, recognized in the video
21 projection screen industry that significantly large screen sizes
22 are available for use. It is apparent that the larger size of
23 such viewing screens 12 may range in size up to and above 84
24 inches. Furthermore, the present invention recognizes that the
25 increased weight of such enlarged viewing screens may also

1 necessitate an additional expanding force. In an illustrated
2 embodiment of the invention, the additional expanding force is
3 derived by including at least one, but preferably two
4 supplemental gas springs 60 and 62 associated in driving
5 relation to each of the arm sets 32 and 34 in order to provide
6 a supplemental driving force to efficiently dispose and maintain
7 the larger viewing screen in the vertically oriented, expanded
8 position for viewing. In this additional embodiment, each of
9 the supplemental gas springs are interconnected between the base
10 portion defined by support bar 28 and the lowermost arm segment
11 36 of each set of arms 32 and 34. As a result, the force of the
12 supplemental gas springs functions to straighten the lowermost
13 arm segments 36 relative to the base portion 26.

14 Since many modifications, variations and changes in detail
15 can be made to the described preferred embodiment of the
16 invention, it is intended that all matters in the foregoing
17 description and shown in the accompanying drawings be
18 interpreted as illustrative and not in a limiting sense. Thus,
19 the scope of the invention should be determined by the appended
20 claims and their legal equivalents.

21 Now that the invention has been described,

1 What is claimed is:

2 1. A video projection screen assembly comprising:

3 a) a screen structured to have video images
4 projected thereon and formed of a material having sufficient
5 flexibility to be disposed between an expanded position and a
6 collapsed position,

7 b) a support frame attached in supporting relation
8 to said screen and structured to dispose and maintain said
9 screen in a substantially flat, vertical orientation when said
10 screen is in said expanded position,

11 c) said support frame comprising a first portion
12 connected to said screen and moveable therewith, and a base
13 portion fixedly disposed relative to said screen and said first
14 portion when said screen travels between said expanded and
15 collapsed positions,

16 d) said support frame further comprising a
17 positioning assembly movably interconnected with said first
18 portion and structured to facilitate travel of said screen from
19 said collapsed position to said expanded position,

20 e) said positioning assembly including at least one
21 piston assembly positionable between a compressed position and
22 an extended position and disposed in driving relation to said
23 first portion and accordingly said screen connected thereto, and

24 f) said at least one piston assembly cooperatively
25 structured with a remainder of said positioning assembly to

1 normally bias and maintain said screen in said expanded
2 position.

3 2. A video projection screen assembly as recited in claim
4 1 wherein said piston assembly comprises a gas spring structured
5 to expand with sufficient force so as to urge and maintain said
6 first portion of said support frame and accordingly said screen
7 connected thereto in said expanded position.

8 3. A video projection screen assembly as recited in claim
9 2 wherein said gas spring is structured to urge said first
10 portion automatically upwardly into spaced apart relation from
11 said base portion so as to define said expanded position of said
12 screen.

13 4. A video projection screen assembly as recited in claim
14 3 wherein said base portion is structured to contain said first
15 portion and said screen upon said screen being in said
16 compressed position, said base portion being substantially
17 portable so as to facilitate expansion of said screen in a
18 remote location.

19 5. A video projection screen assembly as recited in claim
20 4 wherein said base portion includes a pivoting lid member, said
21 lid member structured to contain said first portion and said
22 screen within said base portion when in said compressed
23 orientation.

24 6. A video projection screen assembly as recited in claim
25 5 wherein said positioning assembly is structured to

1 automatically open said lid member upon positioning of said
2 screen into said expanded position.

3 7. A video projection screen assembly as recited in claim
4 1 further comprising a lock assembly structured and disposed to
5 maintain said first portion in closely spaced relation to said
6 base portion, and thereby maintain said screen in said
7 compressed orientation.

8 8. A video projection screen assembly as recited in claim
9 7 wherein said lock assembly is remotely actuatable so as to
10 release said first portion and permit said piston assembly to
11 automatically urge said first portion upwardly into spaced apart
12 relation from said base portion so as to define said expanded
13 position of said screen.

14 9. A video projection screen assembly as recited in claim
15 2 wherein said support frame further comprises at least one set
16 of arms interconnected between said base portion and said first
17 portion.

18 10. A video projection screen assembly as recited in claim
19 9 wherein said one set of arms comprises two arm segments
20 pivotally interconnected to one another at corresponding ends of
21 each arm segment, and each arm segment including a distal end
22 respectively connected to a different one of said first portion
23 and base portion; said one gas spring interconnected in biasing
24 relation with at least one of said two arm segments so as to
25 normally pivotally extend said distal ends of said arm segments

1 apart from one another.

2 11. A video projection screen assembly as recited in claim
3 10 wherein said one gas spring is coupled between both of said
4 arm segments

5 12. A video projection screen assembly as recited in claim
6 9 wherein said positioning assembly further includes an
7 auxiliary spring assembly interconnected between said base
8 portion and said first portion and cooperatively structured with
9 said one gas spring to further bias said screen towards and into
10 said expanded position.

11 13. A video projection screen assembly as recited in claim
12 12 wherein said auxiliary spring assembly is mounted on said one
13 set of arms and is cooperatively structured therewith to further
14 facilitate disposal and maintenance of said screen in said
15 vertical orientation and said expanded position.

16 14. A video projection screen assembly as recited in claim
17 2 wherein said support frame further comprises at least two sets
18 of arms, each set of arms disposed in spaced relation to one
19 another and interconnected between said base portion and said
20 first portion.

21 15. A video projection screen assembly as recited in claim
22 14 further comprising an auxiliary spring assembly mounted on
23 each of said two sets of arms and cooperatively structured with
24 respective ones of said two sets of arms to further facilitate
25 disposal and maintenance of said screen in said vertical

1 orientation and said expanded position.

2 16. A video projection screen assembly as recited in claim
3 14 wherein each of said two sets of arms comprises two arm
4 segments pivotally connected to one another at corresponding
5 ends of said two arm segments, said two arm segments of each set
6 of arms collectively interconnected between said first portion
7 and said base portion.

8 17. A video projection screen assembly as recited in claim
9 16 wherein said positioning assembly comprises at least two of
10 said gas springs each connected in driving relation with at
11 least one of said two arm segments of a different one of said
12 two sets of arms and structured to normally urge said distal
13 ends of said arm segments into spaced apart relation from one
14 another.

15 18. A video projection screen assembly as recited in claim
16 17 wherein said gas springs are connected between said arm
17 segments of each of said sets of arms.

18 19. A video projection screen assembly as recited in claim
19 18 further including an auxiliary spring assembly, said
20 auxiliary spring assembly comprising at least two biasing
21 springs each connected to a different one of said two arms sets
22 and being disposed and cooperatively structured with a
23 respective one of said two gas springs to further bias said
24 screen into said vertical orientation and said expanded
25 position.

1 20. A video projection screen assembly as recited in claim
2 18 wherein said positioning assembly further comprises at least
3 one supplementary gas spring mounted on said support frame in
4 biasing relation to one of said two sets of arms.

5 21. A video projection screen assembly as recited in claim
6 20 wherein said positioning assembly further comprises two
7 supplementary gas springs each mounted on said support frame in
8 biasing relation to a different one of said two sets of arms.

9 22. A video projection screen assembly as recited in claim
10 21 wherein each of said two supplemental gas springs is
11 interconnected between said base portion and one arm segment of
12 a different one of said two sets of arms.

13 23. A video projection screen assembly as recited in claim
14 18 wherein said collapsed position of said screen is at least
15 partially defined by a substantially folded, side by side
16 orientation of said arm segments of each of said two sets of
17 arms and a compressed, retracted orientation of each of said two
18 gas springs.

19 24. A video projection screen assembly as recited in claim
20 1 wherein said screen is structured to retract into a rolled up
21 orientation within said base portion.

22 25. A video projection screen assembly as recited in claim
23 1 further including a retraction assembly structured to retract
24 said screen into said base portion so as to counter a force of
25 said positioning assembly and position said screen in said

1 collapsed position.

2 26. A video projection screen assembly designed to be
3 selectively disposed between an exposed position and a retracted
4 position, said assembly comprising:

5 a) a screen formed of a material having sufficient
6 flexibility to be disposed between an expanded position and a
7 collapsed position,

8 b) a support frame attached in supporting relation
9 to said screen and structured to dispose and maintain said
10 screen in a substantially vertical orientation when said screen
11 is in said expanded position,

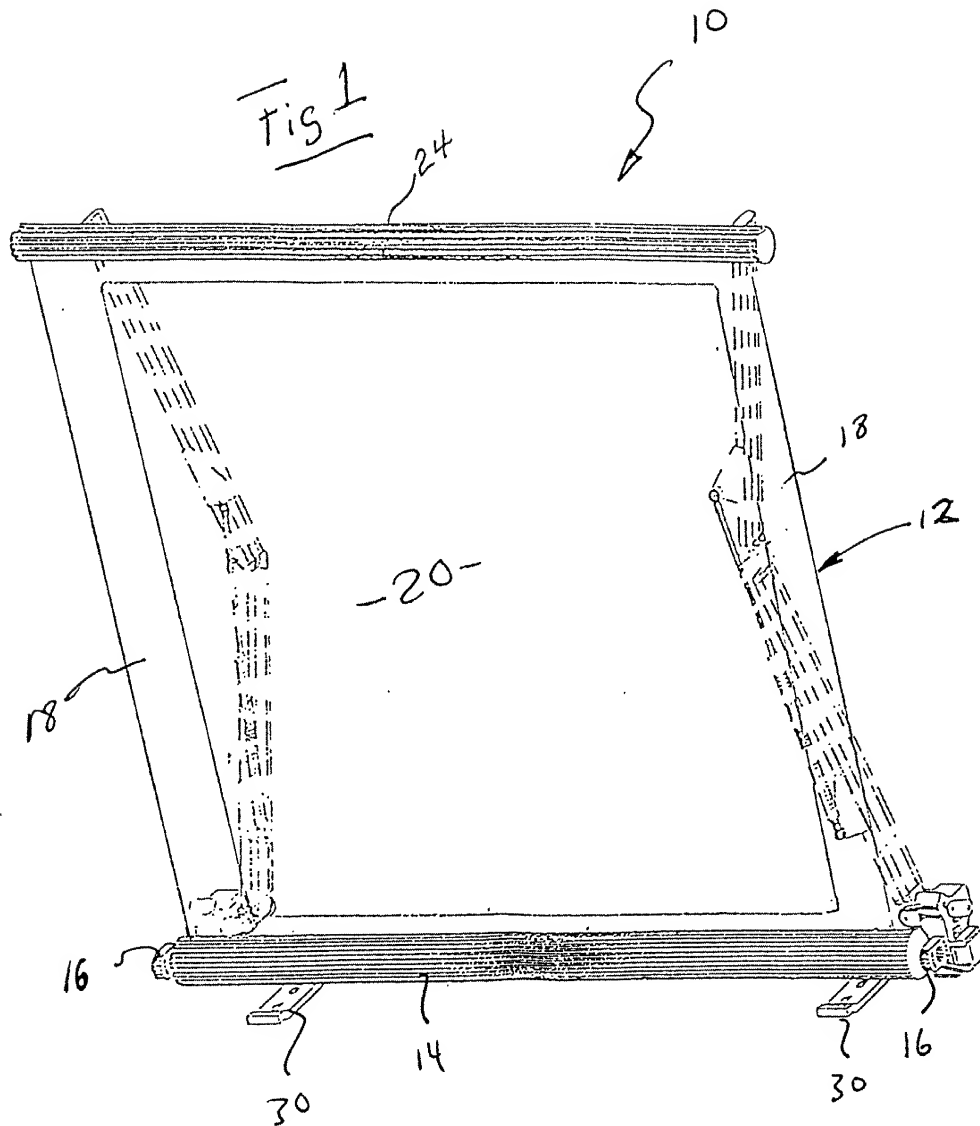
12 c) said support frame comprising a first portion
13 connected to said screen and moveable therewith and a base
14 portion fixedly mounted relative to said screen and said first
15 portion as said screen travels between said expanded and
16 collapsed positions, and

17 d) a positioning assembly including at least one gas
18 spring cooperatively disposed and structured to exert a biasing
19 force on said first portion tending to urge said screen into
20 said vertically oriented, expanded position.

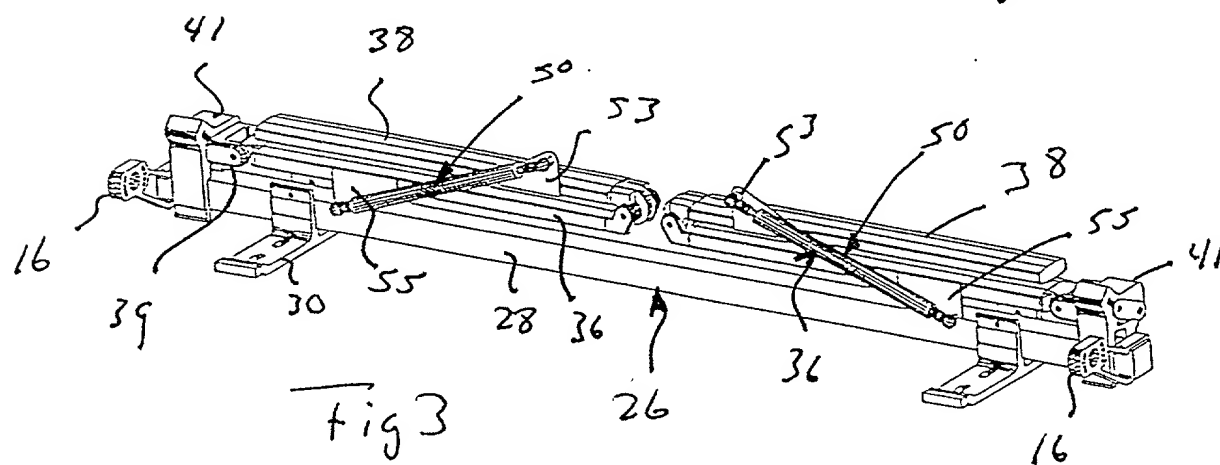
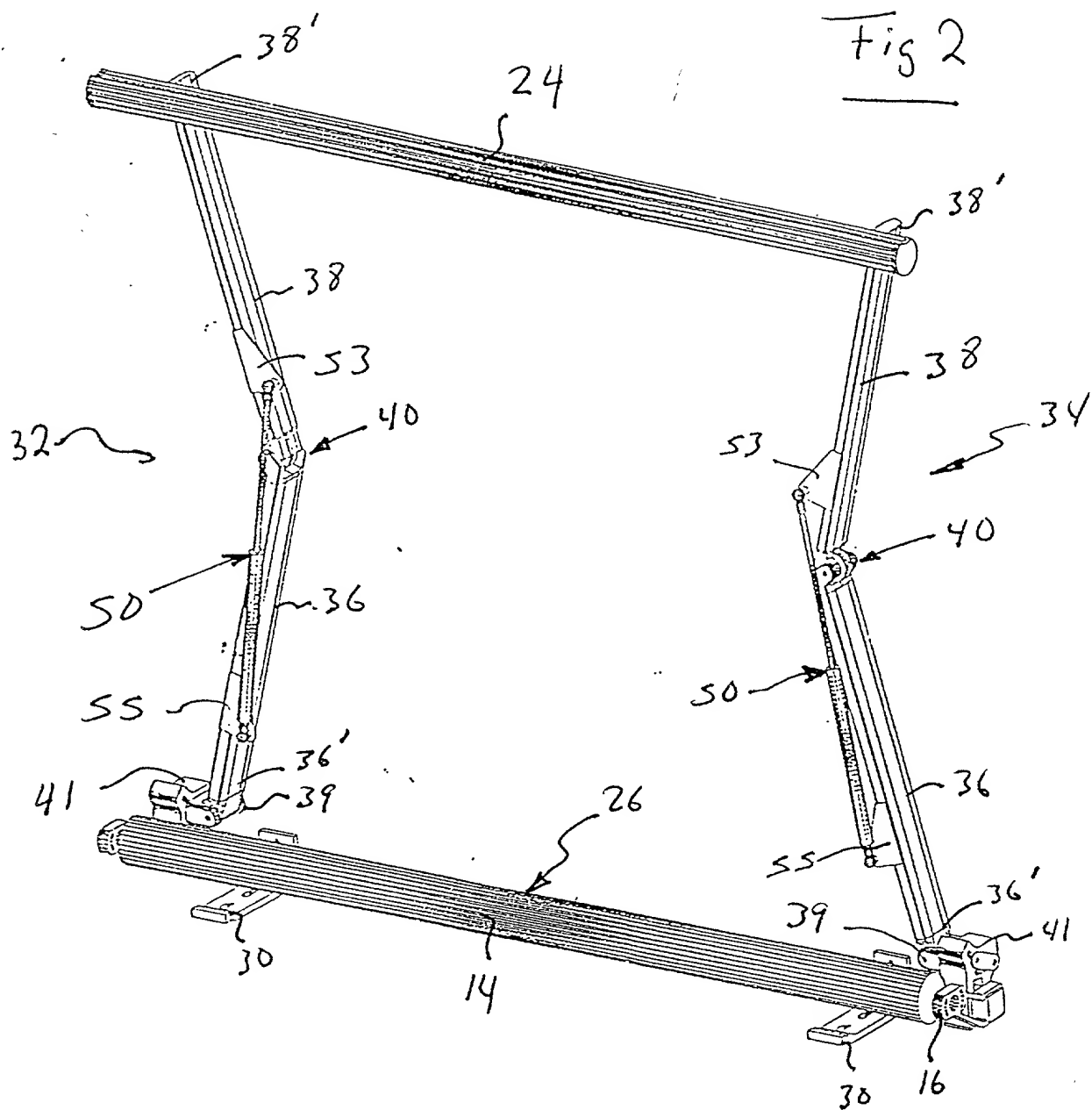
ABSTRACT OF THE INVENTION

A video projection screen assembly for the viewing of images projected thereon and designed to be selectively disposed between an exposed, expanded position for viewing and a collapsed position for storage. A viewing screen is mounted on and supported by a support frame structured to dispose and maintain the viewing screen in the vertical, expanded position for viewing wherein the support frame includes a positioning assembly including one or more spring biased sets of arms wherein each arm set includes a gas spring mounted thereon and cooperatively structured to provide sufficient driving force for disposition of the viewing screen into the vertically oriented, expanded position for viewing when released from its collapsed position. The viewing screen is formed from a relatively heavy, durable, material having sufficient flexibility to be rolled upon itself or otherwise disposed in a collapsed position for storage of the screen and the support frame in an out-of-sight location.

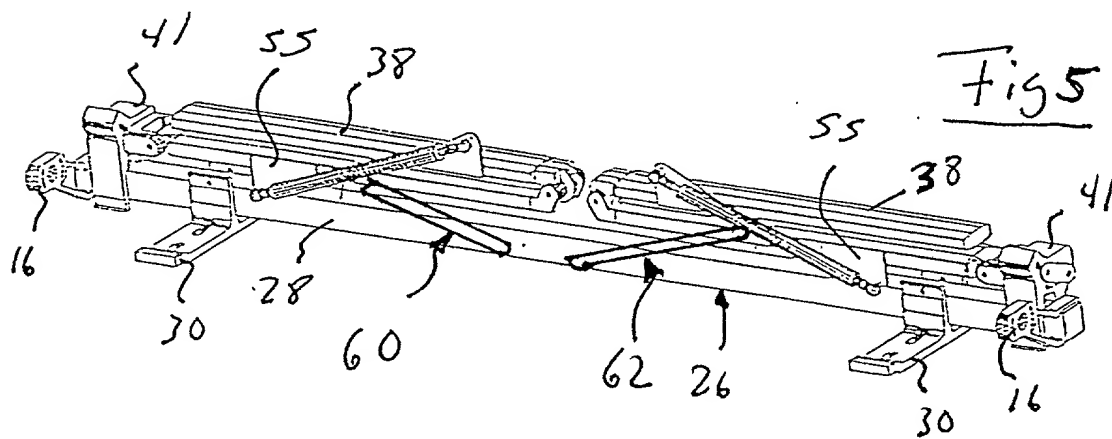
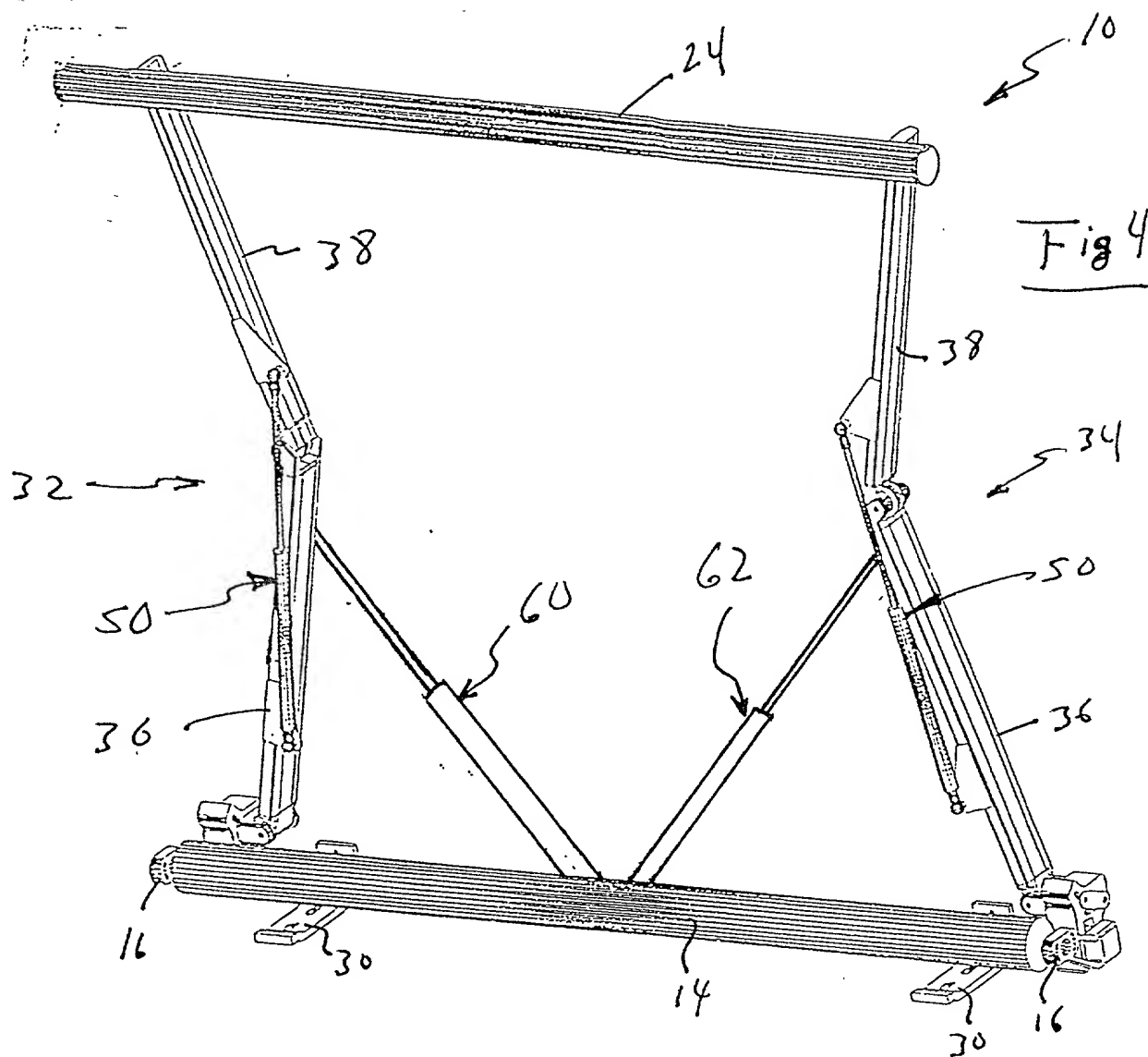
Fig 1



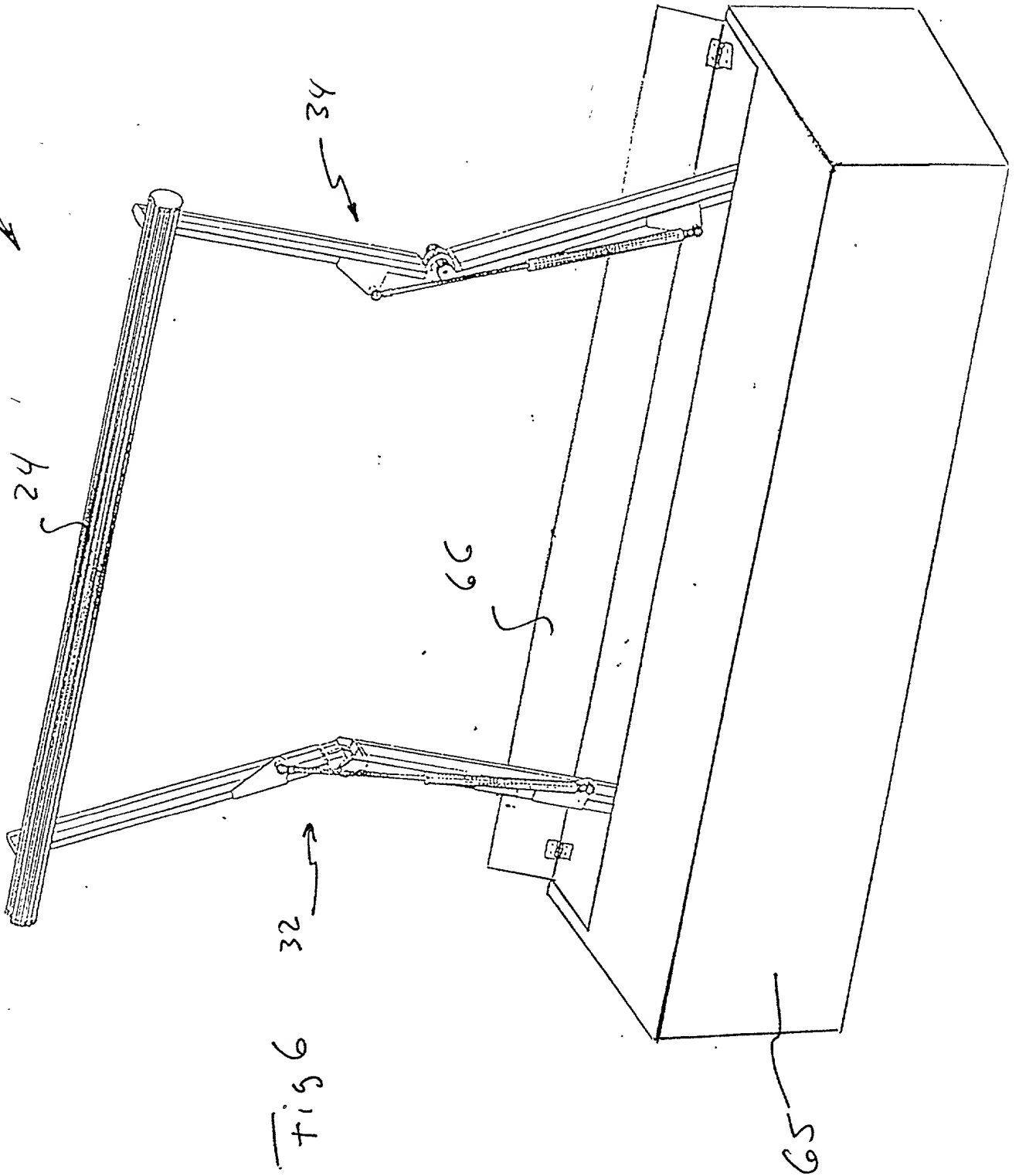
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10



MALLOY & MALLOY, P.A.

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

English Language Division

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A VIDEO
PROJECTION SCREEN ASSEMBLY

the specification of which

(check one)

X is attached hereto

_____ was filed on _____ as

Application Serial No. _____

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate have a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national PCT International filing date of this application:

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made of information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

James E. Wetterling - Reg. No. 31,440

Jennie S. Malloy - Reg. No. 37,670

Peter A. Matos - Reg. No. 37,884

Send correspondence to:

MALLOY & MALLOY, P.A.
2800 S.W. Third Avenue
Historic Coral Way
Miami, Florida 33129

Direct telephone calls to:

(305) 858-8000

Full name of sole or first inventor

DANIEL SINKOFF

Inventor's signature

[Handwritten signature]

Date

8-7-98

Residence

Citizenship

UNITED STATES

Post Office Address

4219 PINWOOD LANE, WESTON, FLORIDA 33331

Full name of second joint inventor, if any

Inventor's signature

Date

Residence

Citizenship

Post Office Address

(Supply similar information and signature for third and subsequent joint inventors.)

INDEPENDENT INVENTOR - SMALL ENTITY STATUS

Applicant or Patentee: Daniel Sinkoff Attorney's
Serial or Patent No.: _____ Docket No.: 1.673.98
Filed or Issued: _____
For: A VIDEO
PROJECTION SCREEN ASSEMBLY

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9(f) and 1.27(b) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled,

A VIDEO PROJECTION SCREEN ASSEMBLY
described in

☒ the specification filed herewith.
☐ application serial no. _____, filed _____
☐ patent no. _____, issued _____

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☒ no such person, concern or organization
☐ person, concerns, or organization listed below*

*Note: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statement were made with the under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF INVENTOR DANIEL SINKOFF NAME OF INVENTOR NAME OF INVENTOR

Signature of Inventor 

Date 8-7-98 Date Date